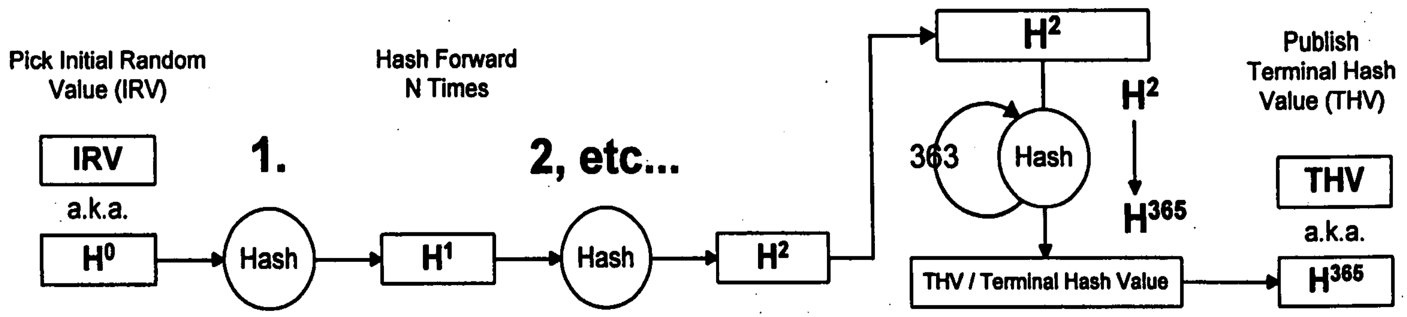
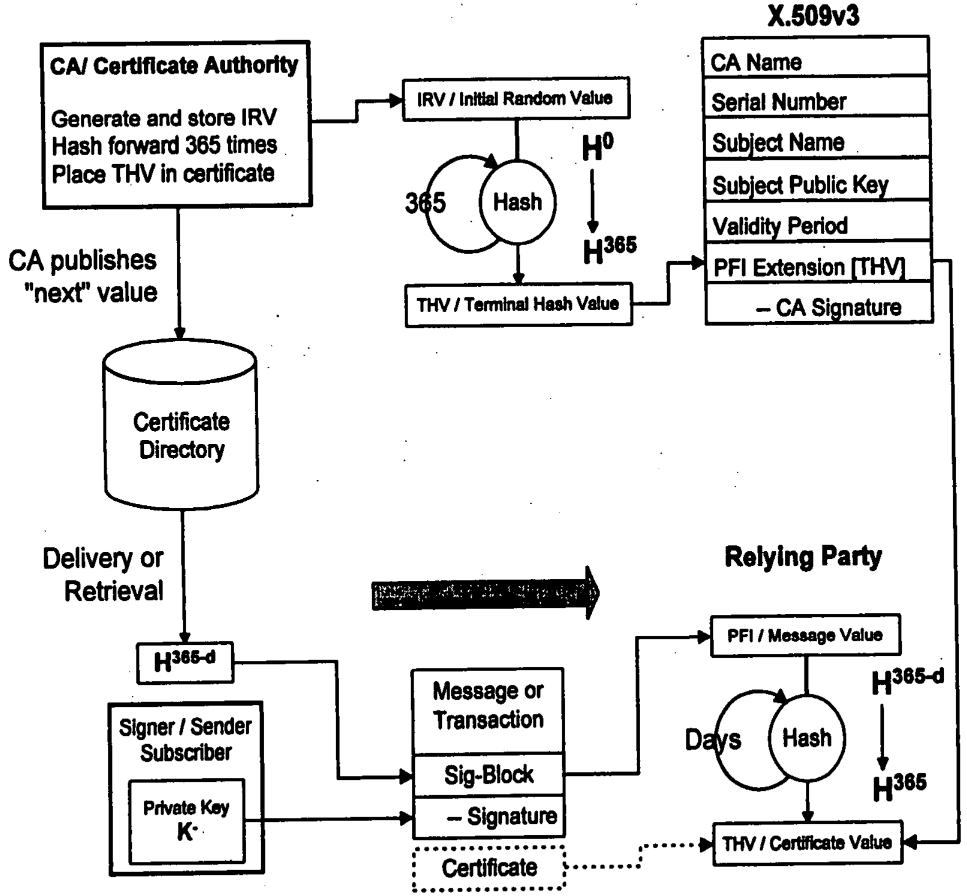
What is Iterated Hashing?



- A simple, fast, secure way to prove you know a secret.
- Hash functions are “fast” but infeasible to reverse.
- Pick a random number (IRV), hash it N times (H^0...H^N), and then publish the terminal value (THV = H^N).
- Revealing a “prior” value (H^{N-D}) proves you know IRV.
- Recipient verifies by hashing forward D times to THV.
- Effect (on a cert) is similar to issuing a fresh signature.

Fig. 1

Application to Secure E-Mail



X.509v3

CA Name
Serial Number
Subject Name
Subject Public Key
Validity Period
PFI Extension [THV]
– CA Signature

CA/ Certificate Authority

Generate and store IRV
Hash forward 365 times
Place THV in certificate

CA publishes "next" value

Delivery or Retrieval

Sender retrieves PFI value
Places in signature block
Signs and sends message

Receive and verify signature
Extract PFI from sig block
Hash forward D days
Compare with THV from cert

Can also support:

- 2-Hourly
- Hourly
- 30 Minutes
- 10 Minutes

PFI = periodic freshness indicator

1 public key operation is equivalent to (approx.) 10,000 hash operations.

Recipient performs no online communication.

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Fig. 2

Application to Server Certs

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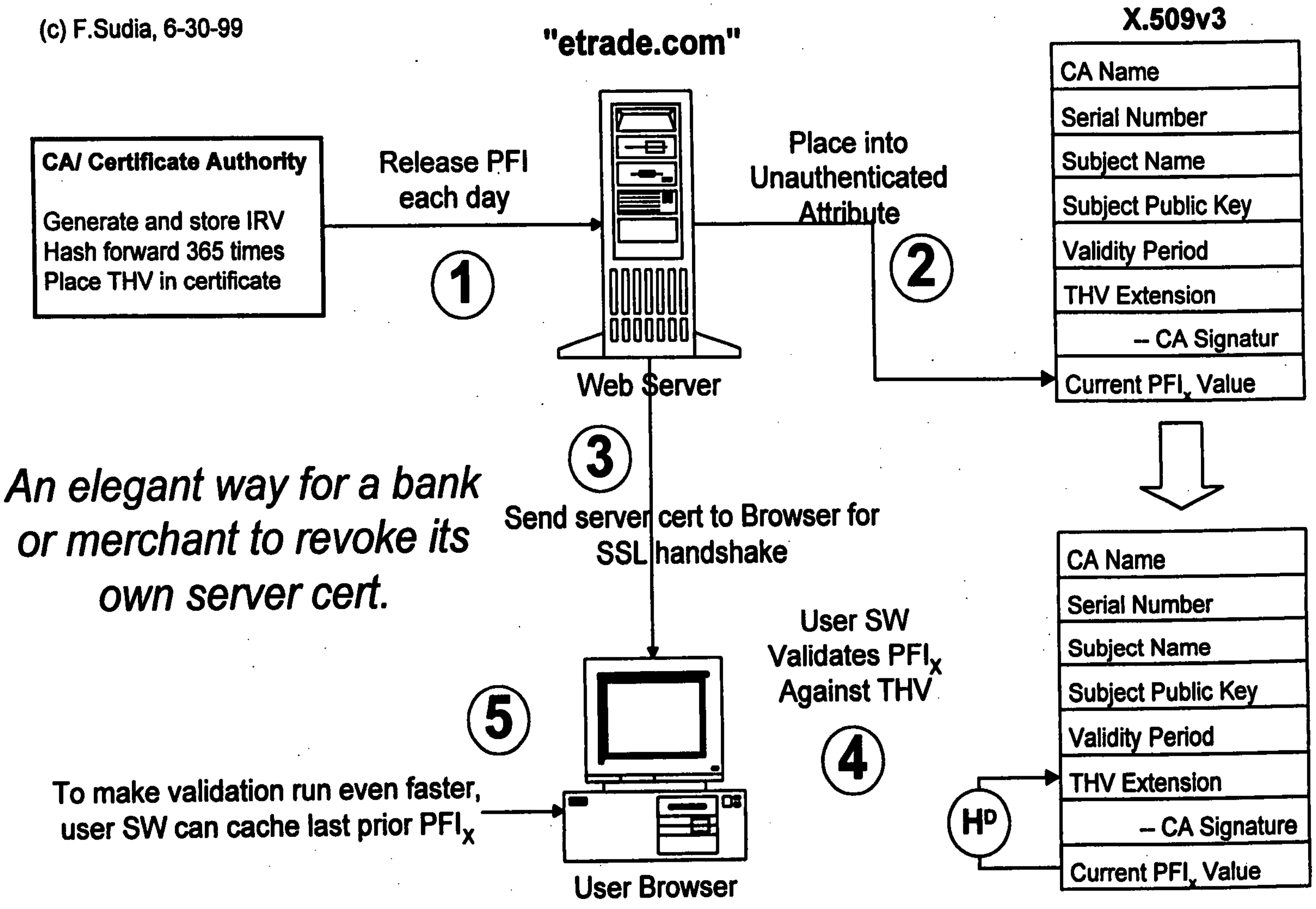

An elegant way for a bank or merchant to revoke its own server cert.

Fig. 3

Structure of Market

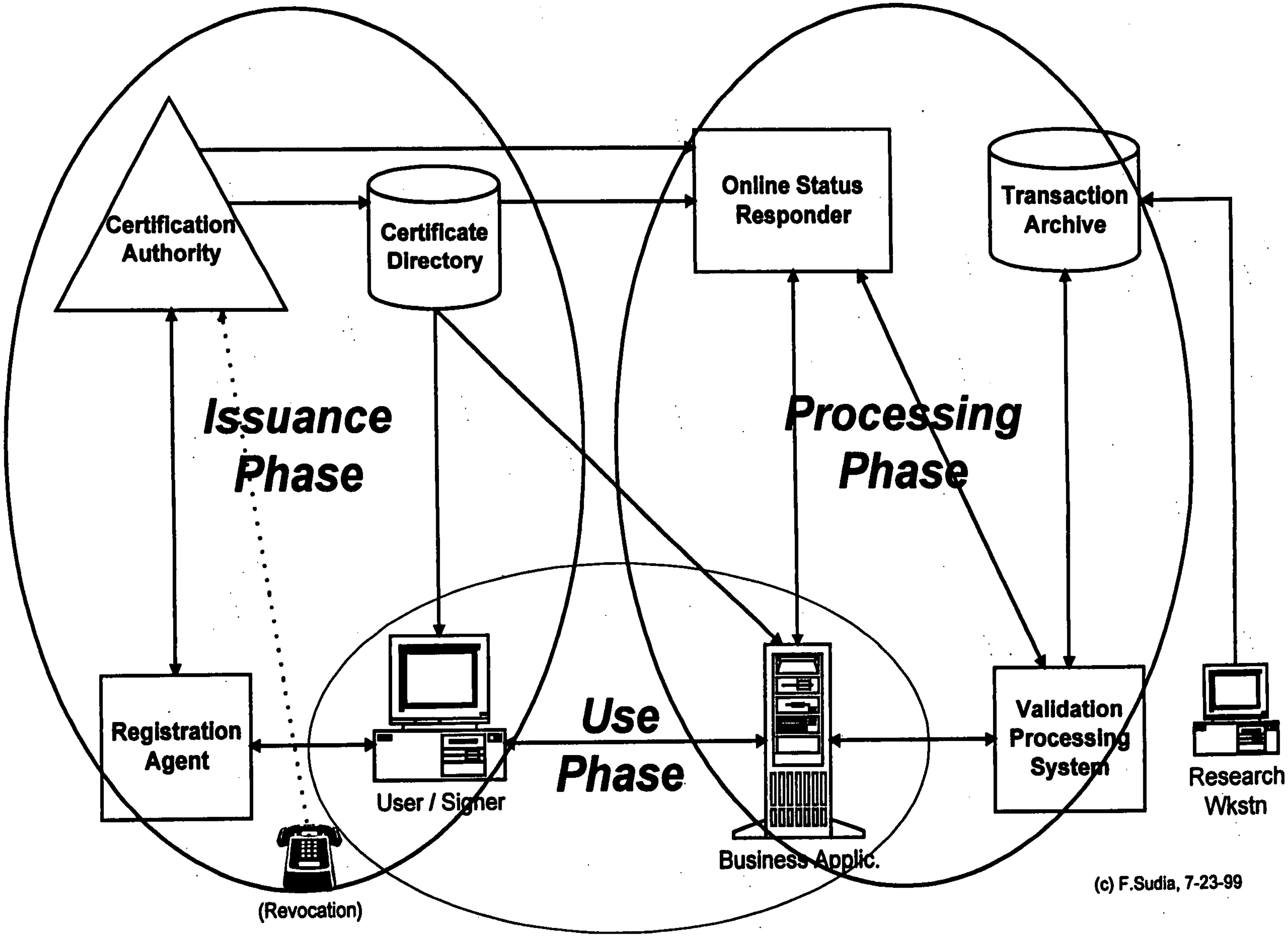

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Fig. 4